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Private sector balance, financial markets, and US cycle: a SVAR analysis

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Abstract

Purpose – Considering the sectoral balance approach of Godley, and focusing only on the two main components of the private sector balance for the US economy (household and non-financial corporate balance), the purpose of this paper is to investigate the relationship between these two sectors, the financial variables, and economic cycle. In particular, the paper considers all these relationships endogenously.

Design/methodology/approach – The authors estimate a structural VAR model between household and (non-financial) corporate financial balances, financial markets, and economic cycle and the authors perform an impulse response analysis. All the variables are expressed as cyclical components applying the Hodrick-Prescott filter.

Findings – The main result is that: household and corporate balances react to financial markets in the way the authors expected and discussed; the economic cycle influences the two financial balances; the corporate balance has a positive impact on the cycle; the economic cycle and financial balances influence the financial variables. In particular, the point that shows that the corporate balance has a positive impact on the cycle shows that the corporate balance is a leading component of the cycle as suggested by Casadio and Paradiso and accords with Minsky's theory of financial instability.

Research limitations/implications – The analysis does not include the foreign sector (current-account balance).

Originality/value – This study is an important step forward with respect to the two main contributions in literature which use this approach: the Levy Institute macroeconomic team and Goldman Sachs. Methodologically their models are based on assumptions (such as exogeneity or market clearing price mechanism for the financial markets) that the authors overcome considering all the relationships studied in an endogenous manner.

Keywords Household financial balance, Corporate financial balance, Business cycle, Financial markets, SVAR, United States of America, Private sector organizations

Paper type Research paper

1. Introduction

One of the most interesting approaches, outside the mainstream context, used to make economic projections is the sectoral balances approach pioneered by Godley (1999) at Levy Institute of Economics. This approach starts from the well-known macroeconomic accounting identity that income must equal spending in the overall economy, because one

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person's spending is always another person's income. This implies that the differences between income and spending in the economy's major sectors – the private sector, the public sector, and the foreign sector – must add up to zero[1]. Although all the balances must equal zero, each variable has a "life of its own" and it is the change of output that brings them into equivalence (Godley *et al.*, 2007). Zezza (2009) explains this point very well:

> If any of the sectors changes its balance, this will have consequences on the growth rate, as well as being reflected on other balances. For instance, an improvement in the foreign balance – generated, say, by a devaluation – will increase GDP, reduce government deficit, and increase saving against investment. An increase in private expenditure over income will also increase GDP and reduce government deficit, but will make the current account balance worse. Analysis of movements in the balances can thus help in understanding the trajectory of the economy.

Goldman Sachs (Hatzius, 2003) and the macroeconomic team at Levy Institute of Bard College (Zezza, 2009) make use of financial balances for prediction purposes to develop a different theoretical framework[2].

The Levy model has been developed along the lines of stock flow consistent models (Godley and Lavoie, 2006). The stock of net financial assets of each sector increases with net saving, and stocks feed back into flows through interest payment or whenever flows adjust towards a stock flow norm (Zezza, 2009)[3]. There are two drawbacks inherent within this framework. First, these models are typically based on a market clearing price mechanism, implying a smooth feed back to the economy. The financial crisis revealed, instead, that financial markets show a persistent deviation from market clearing conditions. Second, in the Levy model, the private sector balance (PSB) is modelled with no distinction between households and corporate balances. Given that these two sectors showed distinctly different patterns over time (as we will see in Section 2), this simplification implies the loss of important information. In particular, it hides the important contribution played by private firms' balances during the economic cycle according to Minsky's insights (1982, 1993), whose results are very important in an explanation of the cycle, as we will see in our analysis.

Hatzius, at Goldman Sachs, has modelled the financial balances dynamics through an error correction mechanism towards a long run equilibrium determined by financial variables. The movements of the balances around the equilibrium cause an effect on output growth. An important aspect of this model is that it considers household and corporate balances separately in the analysis. However, this model has two significant drawbacks. The first is that the sectors are modelled separately (independently of each other) and GDP does not enter into their explanation. This is contrary to the logic of the sectoral balances approach. The second is that the financial markets are exogenous in the analysis, implying only a one-way effect from the financial markets to the economy.

Our contribution is as follows: our analysis on the PSB distinguishes between household and (non-financial) corporate sectors and endogenizes the relationship between the two sectors, output, and financial markets through a vector autoregression (VAR) approach. We concentrate our analysis on these balances because the saving and investment decisions of households and firms can heavily influence the output dynamic.

Methodologically, all the variables are expressed as deviations from their trend. The trend acts as the normal path historically observed in the data. The reasoning for this approach (taking Hatzius's intuition) is that financial balances have an impact on output growth when they gravitate around their normal level.

Through an impulse response function (IRF) – obtained from SVAR estimation with appropriate restrictions on the matrix A of contemporaneous relations – we find that both corporate financial balances have a strong positive impact on GDP growth, and that financial and economic variables have an effect on each other, confirming our view that the mechanism studied is endogenous. In particular, the result that the economic cycle reacts positively to corporate financial balance is in accordance with a Minsky's view of the economy.

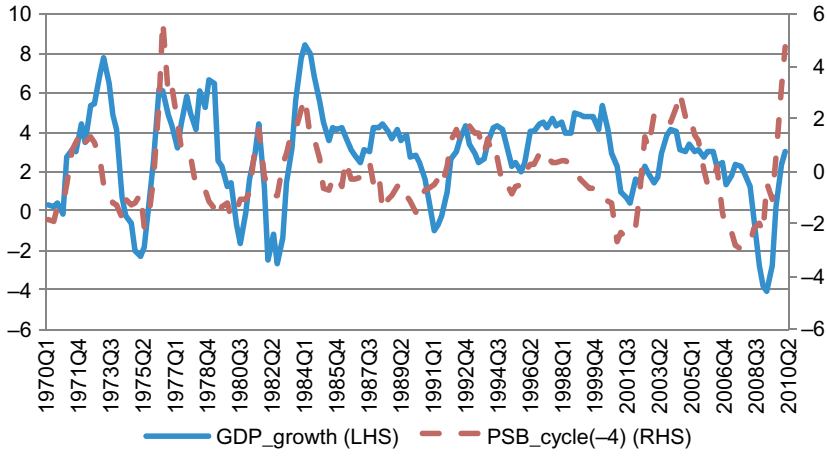
The paper is organized as follows: in Section 2 we explain our approach and the methodological issues. In Section 3, we describe the data and present the results of our VAR estimation and the IRF. Section 4 concludes.

2. The approach and methodological issues

In this section we discuss the characteristics of the approach followed and the methodological aspects.

In our analysis we focus on the PSB; also known in the literature as private net saving) only to study its impact on GDP cycle. The reason is twofold. First, the PSB has historically shown a very close relationship with GDP growth. Figure 1 shows this relationship.

The cyclical pattern of PSB has a significant and positive correlation with GDP with an average lead of four quarters (but the leading time, as we can see in the figure, varies across the years). The explanation is as follows: since the private sector cyclical pattern historically shows a tendency towards mean reversion, the large deficit/surplus today raises the probability of an imminent reversion in the near future. This cyclical behaviour can have a significant impact on future GDP growth. For example, when the private sector is running at a financial deficit (total spending larger than income) this implies a future reversion (reduction of total spending) with a negative impact on the



Notes: Quarterly data: the cycle component of the PSB (PSB_cycle) is obtained through the Hodrick-Prescott filter applied to the ratio of PSB to GDP; real GDP_growth is the real GDP year-on-year growth rate (the level of GDP in one quarter is compared to the level of GDP in the same quarter of the previous year)
Source: BEA

Figure 1.
Cyclical component of the PSB vs real GDP growth

economic cycle. In particular, we can see that the 2001 and 2008 crises were explained very well by a huge unbalancing of the private sector which anticipates economic recession.

Second, the private sector comprises the two agents, household and corporate which, with their decisions on consumption and investment spending, can have a huge impact on output. Given that consumption and investment are two different decisions taken from two different agents, it is better to distinguish them in the analysis. For this reason we split the PSB into households and corporate balances. In particular, we select households and non-financial corporate balances[4] as suggested by Hatzius (2003). Figure 2 shows the importance of this distinction: household and non-financial corporate balances have different patterns over time (in particular they diverge heavily during the 2000s). In Figure 2 we plot the two private balances with GDP growth. We see that non-financial corporate balance shows a closer positive pattern with GDP, in particular after the 1970s (during the period 1980-2010 – the period under investigation in our analysis – the cross correlation between non-financial corporate balance and GDP growth is 0.28, whereas between household balance and GDP growth it is only 0.19).

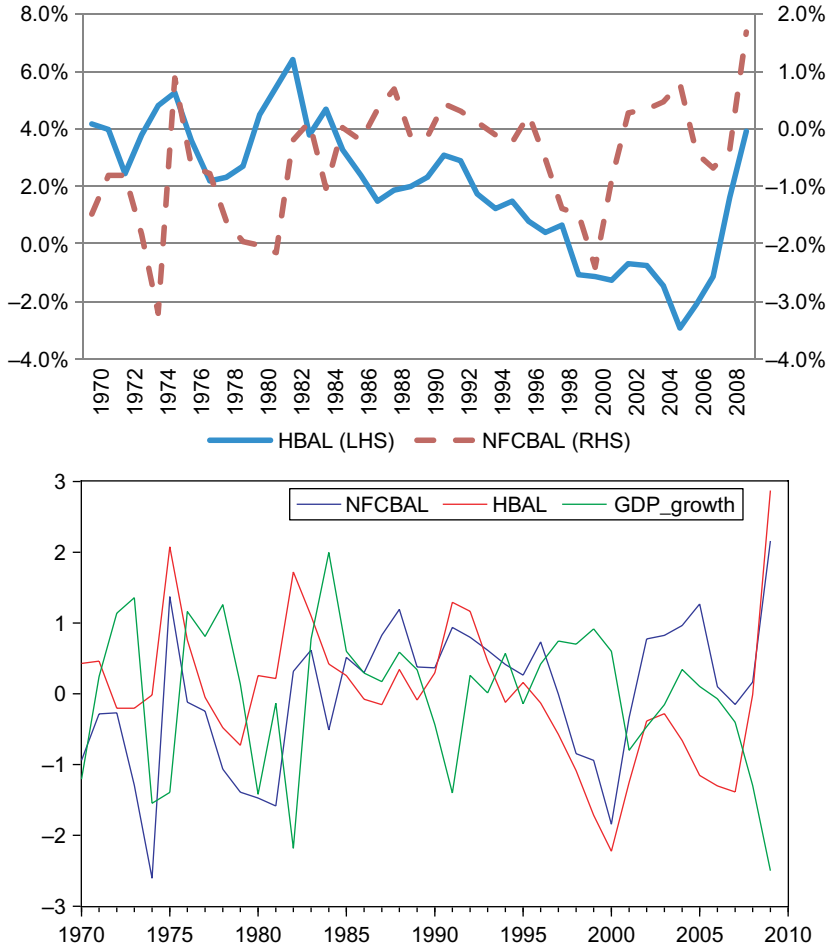
This distinction is important from another aspect. The non-financial corporate balance[5] – corporate profits minus business investments, known as the financing gap with the reversed sign – is a key variable of choice for firms: other than investments, firms decide on the financial imbalance. This variable summarizes Minsky's theory of financial instability and financial cycles (Minsky, 1993). Here we explain briefly the main characteristics of this theory since many economists may be unfamiliar with this non-neoclassical theory of economic cycle[6].

In Minsky's model, the level of investment by a firm is constrained by the cash flows generated by its assets and liabilities, and its ability or willingness to borrow to finance investment. In the early stages of recovery from a recession phase, memories of previous financial calamity increase the perception of risk by borrowers and lenders. Firms reduce their debt (accumulated in a previous phase of the cycle) and finance most of their investment internally. In this phase of the cycle, the corporate financial balance is positive. As recovery persists and leads to expansion, perceptions of risk are reduced and firms begin to increase the amount of debt to finance investment. In this phase, borrowing takes the form of "speculative financing" and the corporate balance reduces, starting to become negative. As the expansion continues, perceptions of risk fall further and firms become "Ponzi-borrowing". The corporate balance continues to fall further. At some point during the expansion phase, some events (such as an expected default by a big corporate) will lower the realized profits under the expectations, causing an increase in the perception of risks by firms, with a consequent pull back from investment spending. The result is a cumulative process in which profits fall, perceptions of risk increase, firms try to pay back their debt, asset prices fall, and the economy enters into a deep recession. In this phase the corporate balance increases and reverts to positive territory.

Combining the financial instability hypothesis with the sectoral balance approach, it is evident that the corporate financial balance plays an important role in explaining the cycle in a dynamic way: a widening positive gap (profits larger than investment) preludes a boom economic phase because the firms, attracted by huge profits, will invest more.

Concerning the methodological issues, we consider these aspects:

- The impact of the financial balances on the economy depends not on the sector's actual financial balance, but whether the sector is above/below its "normal" path



Notes: Annual data: all the series are expressed as a percentage of GDP; HBAL is the household balance, whereas NFCBAL is the non-financial corporate balance; both HBAL and NFCBAL are measured in annual data to facilitate a visual inspection of the data pattern; HBAL and NFCBAL are expressed as a percentage of GDP; all the variables are expressed in annual data and normalized to facilitate a visual inspection of the data pattern
Source: BEA

Figure 2.
Household balance, non-financial corporate balance, and real GDP growth

over time. The "normal" path is identified as the trend pattern historically observable in the data. The trend is an ideal or desirable level of financial balance. When a sector's balance diverges from its normal level, this implies an impulse on GDP growth.

- The cyclical patterns of household and corporate balances are determined by cyclical patterns of financial markets. Stock prices, 10-year Treasury-Note (T-N) yields, and the spread between BAA-corporate bond yields and 10-year T-N yields

(BAA-spread) are the financial variables used in our empirical study. For example, a rise in stock prices implies that households feel richer (the equity wealth effect) and corporate bodies are more optimistic about their future returns on capital. The effect is a rise in their spending. When long term interest rates reduce, households will refinance their mortgages and corporate bodies will be more willing to borrow capital. Also in this case, the effect is a rise in their spending. BAA-spread is a measure of the cost of external finance for corporate bodies. Higher BAA-spread discourages debt-financed spending by firms discouraging investment spending.

- The effects of financial market variables on the fiscal balances have to be understood in a portfolio set up à la Tobin (no market clearing hypothesis is needed). An increase in household balance implies an increase in savings and – coeteris paribus – an increase in the size of a portfolio's assets held by household. More savings push the price up (i.e the *S&P 500*) and down the return of assets (i.e. the long bond). An uncertainty – on a theoretical side – regards the BAA-spread, depending on the relative sensitivities of the return of government bonds versus corporate bonds. An increase of corporate balance has, instead, a specific sectorial effect on portfolio: an increase of profits increase the attractiveness of equity by decreasing the price/earning ratio. The substitution effect in the portfolio should raise the return of government bonds and should reduce the BAA-spread through a decrease in the risk of corporate.
- Given that all the aspects in this comparison are inter-dependent, a deviation of one of the two private sectors implies an effect on output. At the same time GDP brings all the sectors into equivalence. The proper instrument to analyse these aspects is the VAR. We first estimate an unrestricted VAR, and then we identify the structural shocks imposing restrictions on the matrix A of contemporaneous relations.

The IRF points out that households and non-financial corporate balances react to financial markets in a correct way (in a way consistent with our theoretical expectations), the economic variables (GDP and financial balances) influence the financial variables, and that economic cycles react positively to the non-financial corporate balance according to Minsky's insights that we embraced.

3. The empirical VAR model

3.1 The data

The variables used in the empirical VAR analysis are Standard and Poor's 500 index (*S&P 500*), the BAA-spread (the spread between BAA corporate bond yields and 10-year T-N yields) *baas*, the 10-year T-N yields *long10*, the log of real GDP *gdp*, the household balance *hbal*, the (non-financial) corporate balance *nfcbal*. Standard and Poor's 500 index, the household balance, and the corporate balance are measured as a share of GDP. All the variables are expressed as cyclical components with the Hodrick-Prescott filter[7]. The sample uses observations from 1980q1 to 2010q2. Time series are plotted in Figure 3. Details on data source and construction are in the Data Appendix.

3.2 Reduced form model

Given that, by construction, all the variables are stationary, we proceed to estimate the unrestricted VAR model that forms the basis of our analysis. We employ information criteria to select the lag length of the VAR specification, including only a constant.

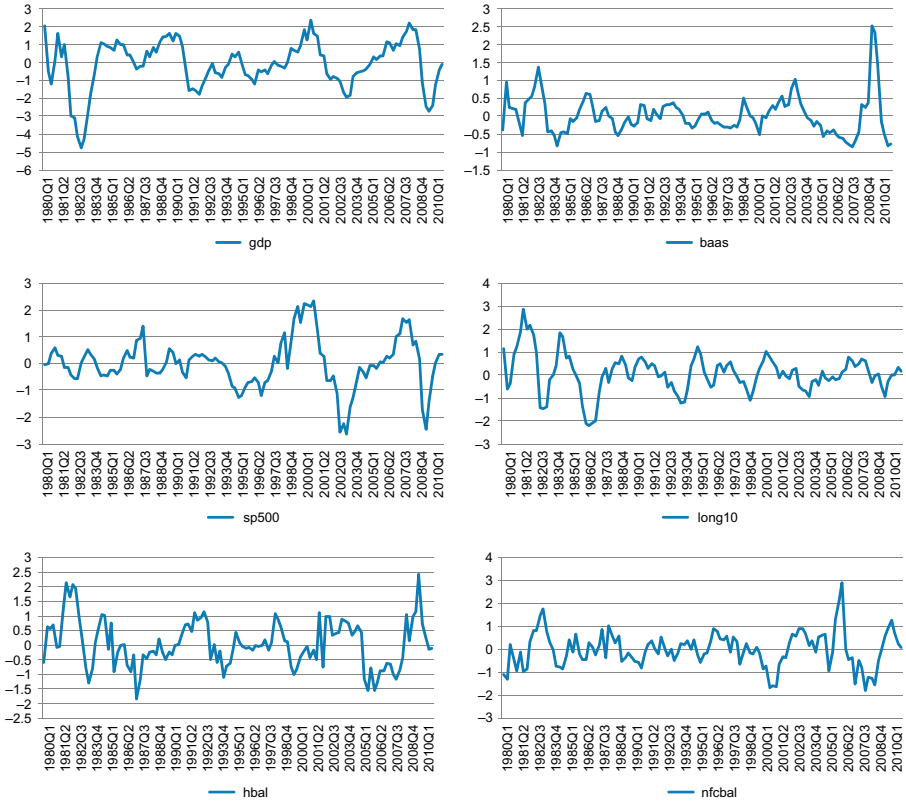


Figure 3.
Time series used in VAR estimation, 1980q1-2010q2

With a maximum lag order of $\rho_{\max} = 8$, Akaike info criteria and final prediction error suggest a lag of two, whereas the Hannan-Quinn and Schwartz criterion suggest only a lag of one. After having estimated the model for the suggested lag lengths – and having excluded the insignificant parameters according to the top-down algorithm (with respect to the AIC criteria) – we conduct the usual diagnostic tests. The results are reported in Table I.

The results are satisfactory, except for some traces of non-normality. Because the VAR estimates are more sensitive to deviations from normality due to skewness than to excess kurtosis (Juselius, 2006), we check these measures for each variable. An absolute value of unity or less for skewness is considered acceptable in the literature (Juselius, 2006).

	Q_{16}	Q^{*}_{16}	LM_5	LJB^{L}_{6}	$MARCH_{LM}(5)$
$\rho = 2$	507.73 (0.84)	550.81 (0.36)	196.02 (0.19)	67.93 (0.00)	2285.45 (0.11)
$\rho = 1$	523.57 (0.83)	564.86 (0.39)	191.74 (0.26)	129.49 (0.00)	2278.62 (0.13)

Notes: p-values are in parentheses; $Q_\rho =$ multivariate Ljiung-Box portmanteau test tested up to the ρth lag; $LM_\rho =$ LM (Breusch-Godfrey) test for autocorrelation up to the ρth lag; $LJB^{L}_{p} =$ multivariate Lomnicki-Jarque-Bera test for non-normality from Lutkepohl and Kratzig (2004) with p variables in the system; $MARCH_{LM}(\rho) =$ multivariate LM test for ARCH up to the ρth lag; an impulse dummy variable for period 2008q4 is considered because of a strong outlier in baa-spread series

Table I.
Diagnostic tests for VAR(p) specifications

Given that for $\rho = 1$ we find a skewness very close to one for the stock price equation, we prefer to select a VAR with two lags. Table II reports specification tests for the single variables for the case $\rho = 2$. Since the skewness values are below the values suggested by the literature, we conclude that non-normality is not a serious problem in our case.

3.3 Structural identification and impulse response analysis

Having specified the reduced form model, we now proceed to the structural analysis. A structural VAR has the following general form:

$$A_0 Y_t = A_1(L) Y_t + B\varepsilon_t \tag{1}$$

Here Y_t represents $K-$vector relevant variables; A_0 and B are $K \times K$ matrices; and $A_1(L) = \sum_{i=1}^{q} A_{i1} L^i$ represents matrices polynomial in the lag operator with A_{i1} being $K \times K$ matrix. ε_t is a K-vector of serially uncorrelated, zero-mean structural shocks with an identity contemporaneous covariance matrix $\left(\Sigma_\varepsilon = E\left[\varepsilon_t \varepsilon_t^{'}\right] = I\right)$.

Provided that A_0 is non-singular, solving for Y_t yields the reduced form of VAR representation:

$$Y_t = A_0^{-1} A_1(L) Y_t + A_0^{-1} B\varepsilon_t \tag{2}$$

or:

$$Y_t = C(L) Y_t + u_t \tag{3}$$

where:

$$C(L) = A_0^{-1} A_1(L) \tag{4}$$

and:

$$u_t = A_0^{-1} B\varepsilon_t \tag{5}$$

or:

$$A_0 u_t = B\varepsilon_t \tag{6}$$

Equation (1) is the structural model of the VAR, whereas equation (2) is the reduced form. The technique involved consists of estimate equation (2) and recovers the parameters and the structural shocks ε_t in equation (1) from these estimates. Equation (6) relates the reduced form disturbances u_t to the underlying structural shocks ε_t. If we set matrix B equal to the identity matrix, then we have to impose $K(K + 1)/2$ zero restrictions for A matrix[8]. In our case, where $K = 6$, the number of necessary zero restrictions is 15. We impose the following restrictions:

Univariate normality test for	*gdp*	*S&P 500*	*baas*	*long10*	*hbal*	*nfcbal*
Norm(2)	9.93 (0.01)	23.25 (0.00)	4.98 (0.08)	20.21 (0.00)	0.62 (0.73)	35.67 (0.00)
Skewness	0.39	−0.57	0.08	0.04	−0.09	0.62
Excess kurtosis	4.16	4.83	3.98	5.00	3.30	5.36

Note: *p*-values are in parentheses

Table II.
Specification tests for VAR(2) model

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ * & 1 & * & * & * & * \\ * & 0 & 1 & * & 0 & 0 \\ * & * & 0 & 1 & 0 & 0 \\ * & * & 0 & * & 1 & 0 \\ * & * & * & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} u_t^{gdp} \\ u_t^{sp500} \\ u_t^{baas} \\ u_t^{long10} \\ u_t^{hbal} \\ u_t^{nfcbal} \end{bmatrix} = \begin{bmatrix} b_{11} & 0 & 0 & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 & 0 & 0 \\ 0 & 0 & b_{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & b_{44} & 0 & 0 \\ 0 & 0 & 0 & 0 & b_{55} & 0 \\ 0 & 0 & 0 & 0 & 0 & b_{66} \end{bmatrix} \begin{bmatrix} \varepsilon_t^{gdp} \\ \varepsilon_t^{sp500} \\ \varepsilon_t^{baas} \\ \varepsilon_t^{long10} \\ \varepsilon_t^{hbal} \\ \varepsilon_t^{nfcbal} \end{bmatrix}$$

where * indicates a parameter that is freely estimated in the system. *gdp* is presumed to adjust slowly to shocks of other variables in the system as assumed by Rotemberg and Woodford (1999). Equity price, instead, is allowed to react instantaneously to all types of shock according to the theory that financial markets reflect all the information in the system. BAA-spread is assumed to react immediately to shocks in output and long term interest rates, whereas long term interest rates are assumed to react instantaneously to *gdp* and *S&P 500*. Household financial balance and corporate balance are assumed to respond without delay to the assumed mainly dependent variables (*gdp*, *S&P 500*, *long10* for *hbal*; *gdp*, *S&P 500*, *baas* for *nfcbal*).

The results of IRF are reported in Figure 4 in the Appendix. We focus here on the key results:

- Household and corporate balance react to financial markets as we expected: *hbal* and *nfcbal* respond negatively to a rise in stock price. A rise in equity pushes consumers and firms to increase their unbalances; *nfcbal* goes up after a rise in BAA-spread, *hbal* rises in the presence of an increase in the cost of external finance.
- Economic cycle influences the financial balances: a rise in the *gdp* raises the household balance positively, but causes a fall in the corporate balance. This occurs because higher income means higher savings (for households), whereas higher *gdp* means higher business investments (for corporate).
- Corporate balance has a positive impact on GDP cycle as we expected. This result confirms that corporate balance is a leading component of the cycle as suggested by Casadio and Paradiso (2009) and according to Minsky's theory of financial instability.
- Economic cycle and financial balances influence the financial variables. A positive shock in the economic cycle makes future expectations of economic activity more optimistic and reduces the risk premia, tightening the baa spread. A positive shock in *gdp* raises long term interest rates (as long term interest rates are the average of expected future short term rates, and a rise in *gdp* implies that there will be expectations of an increase in short term interest rates). As expected, an increase of *hbal* implies an increase in the stock market index, *S&P 500*. This is due to an increase of the overall size of the household portfolio, increasing the price of financial assets and decreasing the return of the long government bond. The effect of *hbal* on long bond yield turns out to be insignificant, and the same happens for the BAA-spread. A positive shock on *nfcbal*, for example, due to higher profits, translates into higher stock prices for the attractiveness that the stock exerts when the price-earning ratio falls.

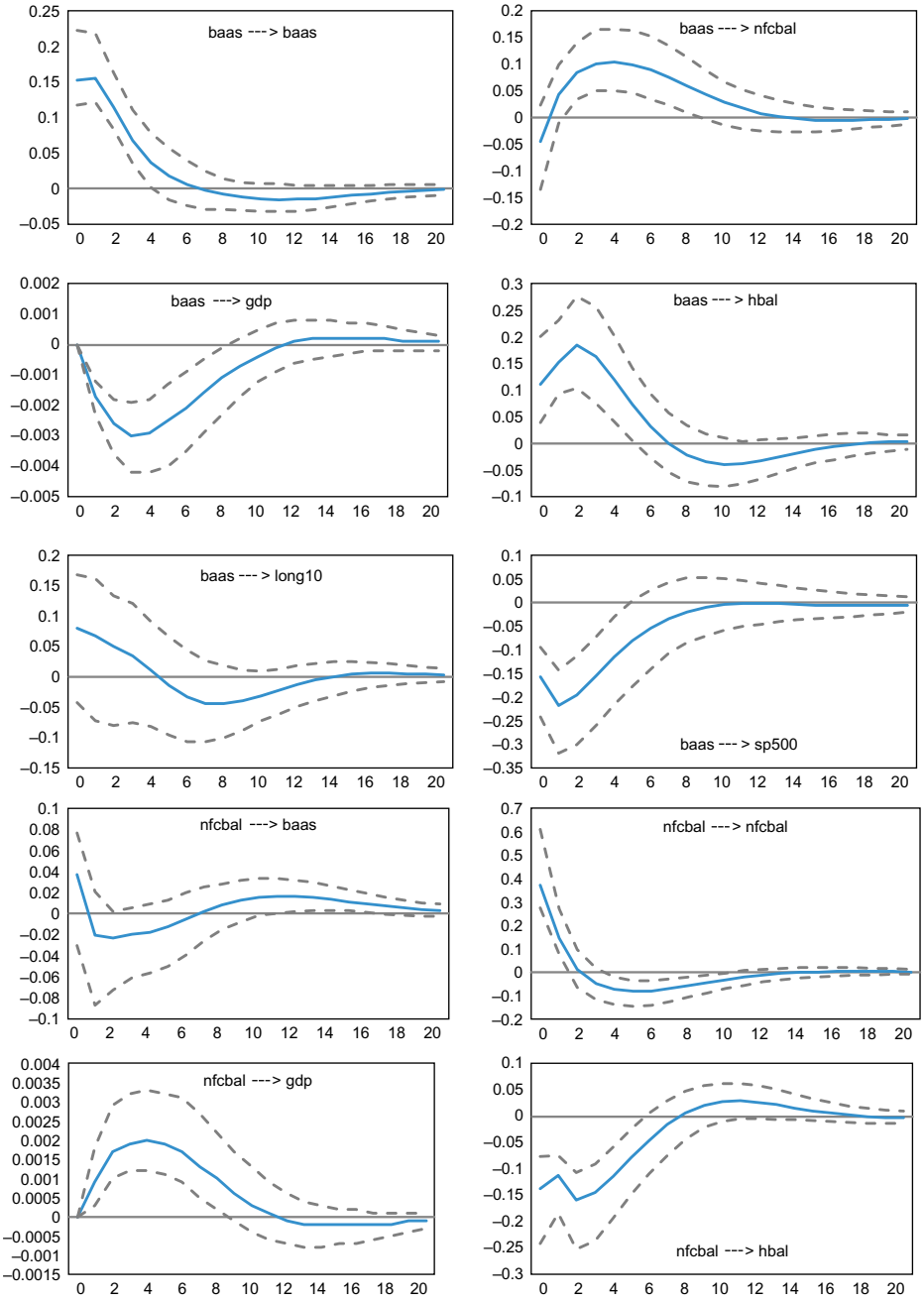


Figure 4.
Impulse response, structural VAR

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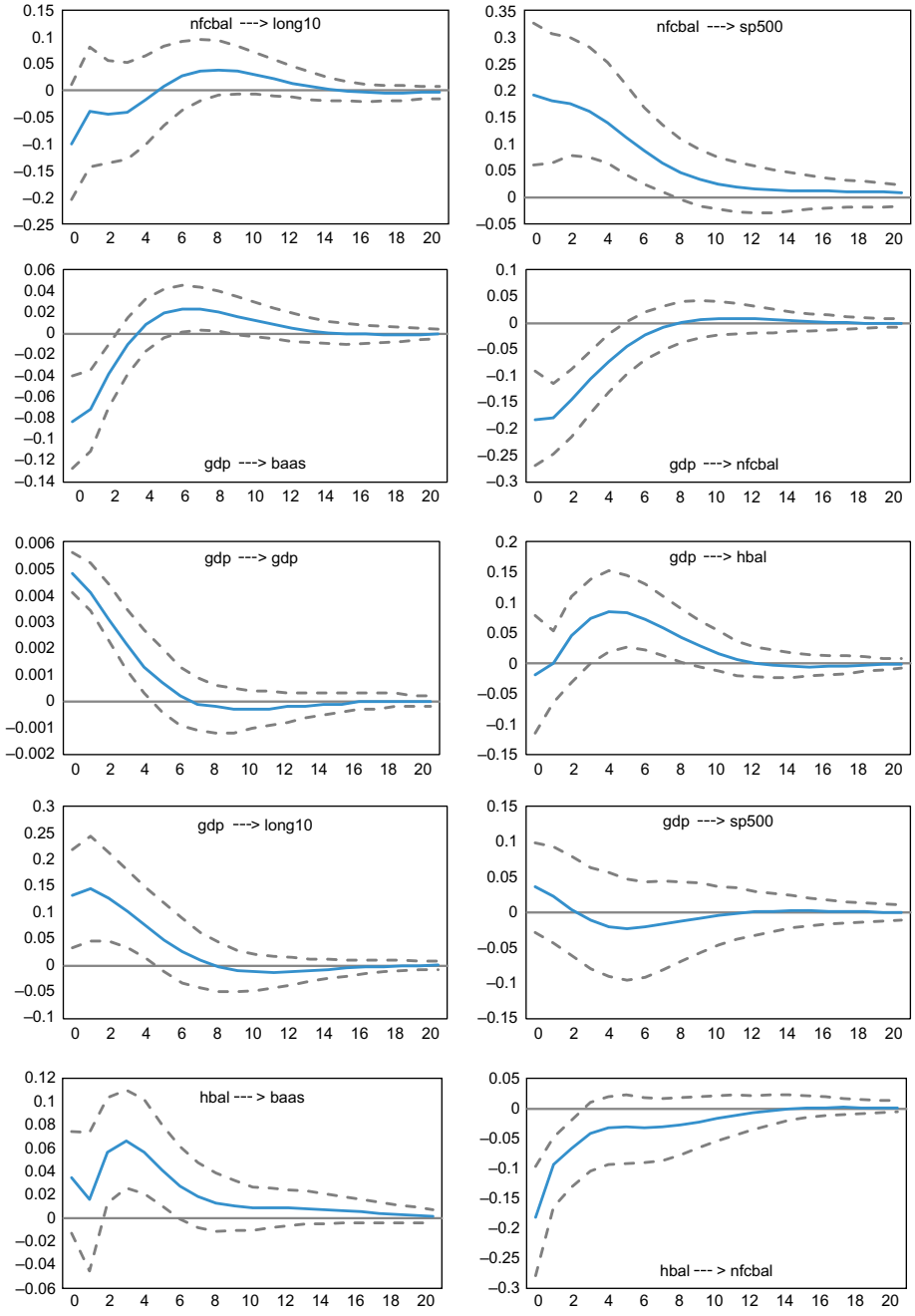

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Figure 4.

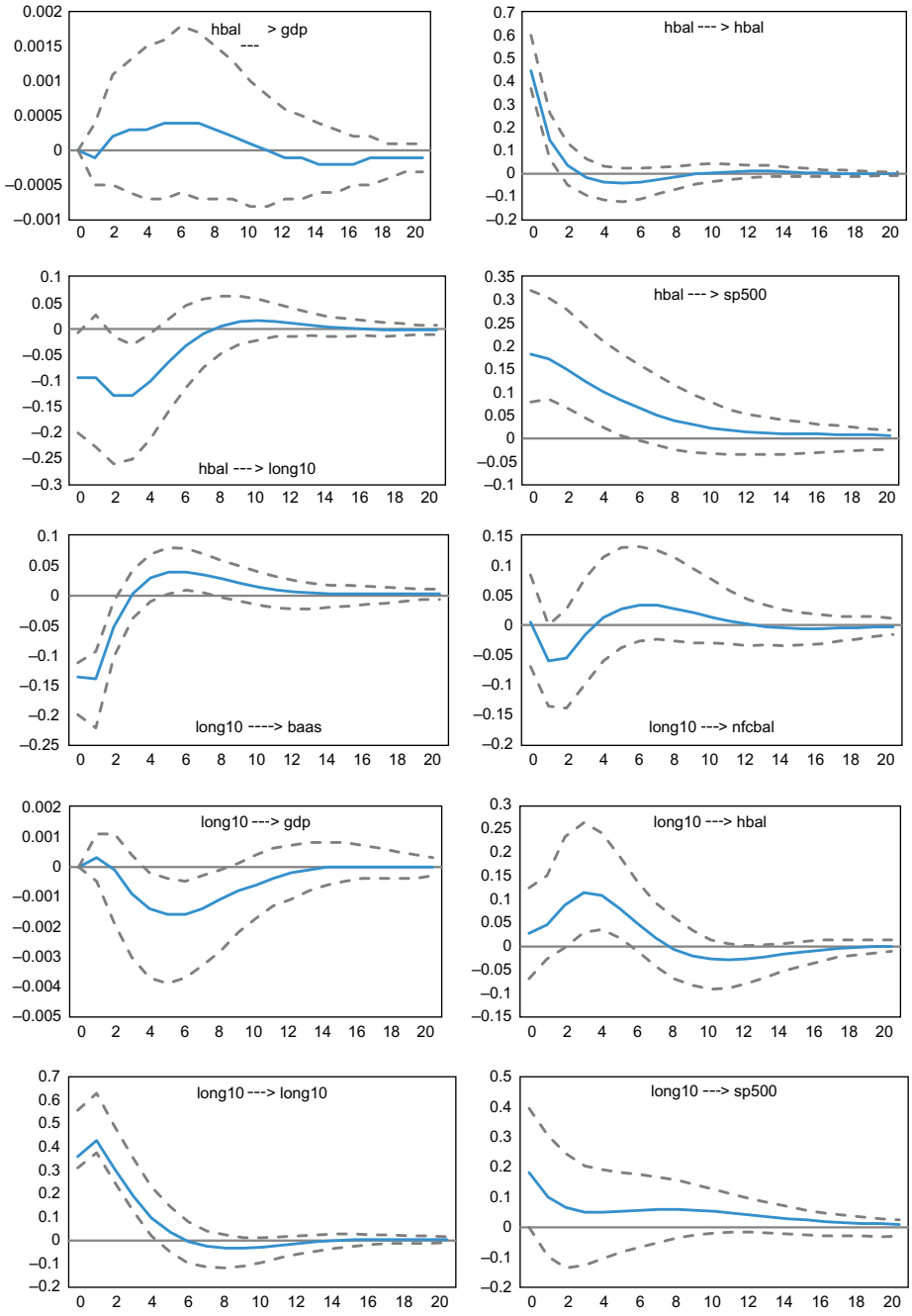

Figure 4.

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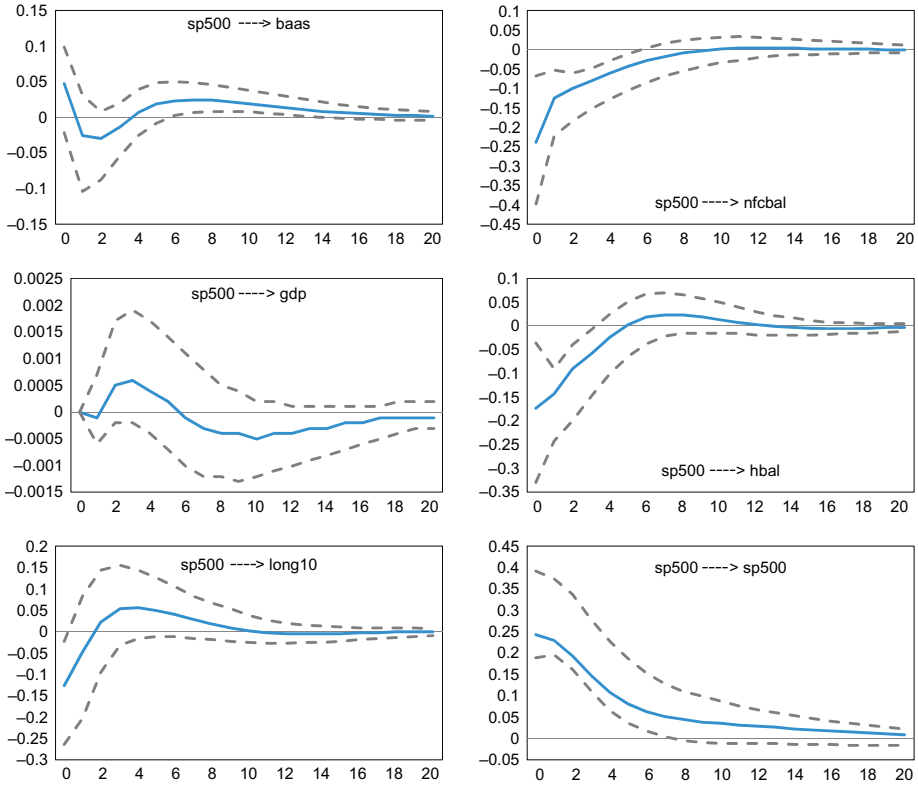

Note: Dotted lines indicate 95 percent Hall bootstrap confidence intervals using 1,000 bootstrap replications

Figure 4.

4. Conclusions

We reconsidered the sectoral balances approach of Godley, focusing our attention on the two main components of the PSB and on their interactions: household and (non-financial) corporate balances. Through a structural VAR estimation, obtained imposing restriction on the contemporaneous effects matrix, and the relative IRF, we find that:

- household and corporate balances react to financial markets in the way we discussed;
- the economic cycle influences the two financial balances;
- the corporate balance has a positive impact on the cycle;
- the economic cycle and financial balances influence the financial variables.

In particular, point (3) shows that the corporate balance is a leading component of the cycle as suggested by Casadio and Paradiso (2009) and accords with Minsky's theory of financial instability. Our contribution – which aims to endogenize all the mechanisms behind the sectorial balances approach – is an important improvement with respect to Levy Institute and Goldman Sachs' contributions.

Notes

1. For details on this point see, for example, the technical Appendix in Papadimitriou *et al.* (2009).
2. The actual crisis has raised the interest of economists toward this approach. Krugman (2009), from the pages of his blog, presented an explanation of the US economy's business cycles in the form of an IS-LM scheme obtained depicting the private and public balances in a diagram where the vertical axis is the state of the balance (surplus/deficit) and the horizontal axis is the GDP.
   Parenteau (2010) and Wilder (2010), on the pages of Roubini Global Economics, used the sectoral balances accounting identity to discuss the policy of fiscal deficit reduction adopted by various countries in order to reduce the government debt ratio.
3. Financial balances imply an accumulation of net financial assets. Whenever a balance is in negative territory, for example, it can thus be interpreted as net increase in debt, which may be unsustainable above a given threshold level. These norms are well known in the case of government, where political discussions often centre on sustainable public debt to GDP ratio.
4. We focus only on the non-financial corporate sector for the following reason. According to Demirguc-Kunt and Levine (1999), countries "such as UK and the United States" are classified as "market-based financial systems", where "securities markets share center stage with banks in terms of getting society's savings to firms, exerting corporate control, and easing risk management". In this paper we stress the importance of financial markets in interacting with the real side of the economy. To keep the VAR as a small size system we do not consider banks and, consequently, we do not explain their behavior. This extension would highly increase the complexity of the analysis, not necessarily giving a better explanation of the real financial interaction. We therefore refer to a portfolio approach à la Tobin to model the basic linkages between real and financial variables.
5. Hereafter in the paper we refer indifferently to corporate balance and non-financial corporate balance, with the specification that we are always referring to non-financial corporate balance.
6. For a complete explanation, see Minsky (1982).
7. We acknowledge the endpoint bias of HP filter. Other authors such as Bernanke *et al.* (1997) use HP filtered data in VAR methodology. Future consideration may involve other choices of filter to overcome such a shortfall. Nonetheless, our choice of the HP filter is based on its parsimoniousness and ease of implementation. We believe nonetheless that, for our purpose, HP filter suffices and our results are robust for choices of filters.
8. For an explanation on this point, see Lutkepohl and Kratzig (2004).

References

Bernanke, B.S., Gertler, M. and Watson, M. (1997), "Systematic monetary policy and the effects of oil price shocks", *Brookings Papers on Economic Activity*, Vol. 1, pp. 91-157.

Casadio, P. and Paradiso, A. (2009), "A financial sector balance approach and the cyclical dynamics of the US economy", Economics Working Paper No. 576, Levy Economics Institute, New York, NY.

Demirguc-Kunt, A. and Levine, R. (1999), "Bank-based and market-based financial systems: cross-country comparisons", World Bank Policy Research Working Paper Series No. 2143.

Godley, W. (1999), "Seven unsustainable processes: medium-term prospects and policies for the United States and the world", Strategic Analysis Archive, Levy Economics Institute, New York, NY, January.

Godley, W. and Lavoie, M. (2006), *Monetary Economics: An Integrated Approach to Credit, Money, Income, Production, and Wealth*, Palgrave Macmillan, Basingstoke.

Godley, W., Papadimitriou, B.D., Hanngsen, G. and Zezza, G. (2007), "The US economy: is there a way out of the woods?", Strategic Analysis Archive, Levy Economics Institute, New York, NY, April.

Hatzius, J. (2003), "The private sector deficit meets the GSFCI: a financial balances model of the US economy", Global Economics Paper No. 98, Goldman Sachs, New York, NY.

Juselius, K. (2006), *The Cointegrated VAR Model: Methodology and Applications*, Oxford University Press, Oxford.

Krugman, P. (2009), "Deficits saved the world", available at: http://krugman.blogs.nytimes.com/2009/07/15/deficits-saved-the-world/ (accessed December 20, 2010).

Lutkepohl, H. and Kratzig, M. (Eds) (2004), *Applied Time Series Econometrics*, Cambridge University Press, Cambridge.

Minsky, H.P. (1982), *Can "It" Happen Again? Essays on Instability and Finance*, M.E. Sharp, Armonk, NY.

Minsky, H.P. (1993), "The financial instability hypothesis", in Arestis, P. and Sawyer, M. (Eds), *Handbook of Radical Political Economy*, Edward Elgar, Aldershot.

Papadimitriou, D.B., Hannsgen, G. and Zezza, G. (2009), "Sustaining recovery: medium – term prospects and policy for the US economy", Strategic Analysis Archive, Levy Economics Institute, New York, NY, December.

Parenteau, R. (2010), "On fiscal correctness and animal sacrifices", available at: www.nakedcapitalism.com/2010/03/parenteau-on-fiscal-correctness-and-animal-sacrifices-leading-the-piigs-to-slaughter-part-1.html (accessed December 20).

Rotemberg, J.J. and Woodford, M. (1999), "Interest rule in an estimated sticky-price model", in Taylor, J.B. (Ed.), *Monetary Policy Rules*, University of Chicago, Chicago, IL.

Wilder, R. (2010), "Who's saving where? An application of the 3 sector financial balances map", available at: www.roubini.com/globalmacro-monitor/259787/who_s_saving_where__an_application_of_the_3_sector_financial_balances_map (accessed December 20).

Zezza, G. (2009), "Fiscal policy and the economics of financial balances", Working Paper No. 569, Levy Economics Institute, New York, NY.

Data Appendix

Standard and Poor's 500 index, BAA-spread, 10-year T-N yields, and GDP are from FRED (Federal Reserve Economic Data). BAA-spread is obtained as the difference between corporate bond yields and 10-year T-N yields.

Household and corporate balances are obtained from Flow-of-Funds (FoF) accounts of the Boards of Governors of the Federal Reserve System.

Household balance = gross saving (line 10 of Table F.100 in the FoF) minus capital expenditures (line 12 of Table F.100 in the FoF).

(Non-financial) corporate balance = internal funds with IVA minus total capital expenditures (line 54 of Table F.102 with sign reversed in the FoF).

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